

CLAIMS

1. A remaining amount of toner detecting apparatus which detects a remaining amount of toner stored in a housing for storage of toner, the remaining amount of toner detecting apparatus comprising:

a detection auxiliary member disposed in the housing;

a holding member which is flexible and has one end connected to an outer periphery of a stirring member which is rotated to stir the toner in the housing, and another end at which the detection auxiliary member is held;

detecting means disposed near the lower portion of the housing, for detecting a distance from the detecting means to the detection auxiliary member when the detection auxiliary member is moved by rotation of the stirring member and passes through a detection position; and

calculating means for calculating the remaining amount of the toner based on the distance from the detecting means to the detection auxiliary member.

2. The remaining amount of toner detecting apparatus of claim 1, wherein the detection auxiliary member passes through a predetermined detection position, and thereby a magnetic field in the detection position is changed; and

the detecting means detects the distance to the detection auxiliary member based on the change of the magnetic field in the detection position by the detection auxiliary member.

3. The remaining amount of toner detecting apparatus of claim 2, wherein the detection auxiliary member is made of a material having electrical conductivity.

4. The remaining amount of toner detecting apparatus of claim 2, wherein the detection auxiliary member is made of a material having magnetism.

5. The remaining amount of toner detecting apparatus of any one of claims 1 to 4, wherein the length between both ends of the holding member is equal to or less than one half of the circumference of a circle whose radius is the distance from the rotation center of the stirring member to the outer periphery.

6. The remaining amount of toner detecting apparatus of any one of claims 1 to 5, wherein the maximum detectable distance of detectable distances to the detection auxiliary member by the detecting means is smaller than the distance between the movement path of the outer

periphery and the detecting means when the stirring member is rotated.

7. The remaining amount of toner detecting apparatus of any one of claims 1 to 6, wherein the detecting means is provided with a plurality of detecting portions whose maximums of detectable distances to the detection auxiliary member are different.

8. The remaining amount of toner detecting apparatus of any one of claims 1 to 7, wherein the detecting means is provided with a plurality of detecting portions disposed in different positions with respect to the movement direction of the outer periphery of the stirring member.

9. The remaining amount of toner detecting apparatus of any one of claims 1 to 8, further comprising notifying means for giving notice of information on the calculated remaining amount of the toner.

10. The remaining amount of toner detecting apparatus of claim 9, wherein when the remaining amount of the toner is a predetermined reference amount or less, the notifying means gives notice that the remaining amount of the toner

is not more than the predetermined reference amount.

11. The remaining amount of toner detecting apparatus of claim 9, wherein the notifying means gives notice of the number of sheets of images which can be formed of the remaining amount of the toner.

12. The remaining amount of toner detecting apparatus of any one of claims 9 to 11, wherein the notifying means gives notice of information on the remaining amount of the toner in a multistage manner or in a row in response to the remaining amount of the toner.

13. The remaining amount of toner detecting apparatus of any one of claims 1 to 12, wherein the detecting means is a permeability sensor.

14. A toner cartridge installed in an image forming apparatus so as to be attached thereto and detached therefrom, the toner cartridge comprising:

 a housing for storage of toner;

 a stirring member disposed in the housing so as to rotate and stir thereby the toner in the housing;

 a detection auxiliary member disposed in the housing; and

a holding member which is flexible and has one end connected to the outer periphery of the stirring member, and another end at which the detection auxiliary member is held.

15. The toner cartridge of claim 14, wherein the lower portion of the housing is formed into a curved shape which is convex down with respect to the movement direction of the outer periphery of the stirring member.

16. An image forming apparatus comprising:

a housing in which toner is stored;

a stirring member which is disposed in the housing so as to be capable of rotating and stirs the toner in the housing by rotating; and

a remaining amount of toner detecting apparatus comprising:

a detection auxiliary member disposed in the housing;

a holding member which is flexible, one end of which is connected to the outer periphery of the stirring member, and the other end of which holds the detection auxiliary member;

detecting means disposed near the lower portion of the housing, for detecting the distance to the

detection auxiliary member when the detection auxiliary member is moved by rotation of the stirring member and passes through a detection position; and

calculating means for calculating the remaining amount of the toner based on the distance from the detecting means to the detection auxiliary member.

17. An image forming apparatus comprising:

an image forming apparatus main unit; and

a toner cartridge installed in the image forming apparatus main unit so as to be attached thereto and detached therefrom, the toner cartridge comprising:

a housing in which toner is stored;

a stirring member which is disposed in the housing so as to rotate and stir the toner in the housing;

a detection auxiliary member disposed in the housing; and

a holding member which is flexible and has one end connected to the outer periphery of the stirring member, and another end at which the detection auxiliary member is held,

wherein the image forming apparatus main unit includes:

detecting means disposed near the lower portion of the housing, for detecting the distance to the detection

auxiliary member when the detection auxiliary member is moved by rotation of the stirring member and passes through a detection position; and

calculating means for calculating the remaining amount of the toner based on the distance from the detecting means to the detection auxiliary member.